Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Service Rules for the 698-746, 747-762 and 777-792 MHz Bands	)	WT Docket No. 06-150
	)	
Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems	)	CC Docket No. 94-102
	)	
Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones	)	WT Docket No. 01-309
	)	
Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services	)	WT Docket No. 03-264
	)	
Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules	)	WT Docket No. 06-169
	)	
Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band	)	PS Docket No. 06-229
	)	
Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010	)	WT Docket No. 96-86

To: The Commission

REPLY COMMENTS OF NORTHROP GRUMMAN INFORMATION TECHNOLOGY, INC.

Northrop Grumman Information Technology, Inc. ("Northrop Grumman") hereby submits its Reply Comments in response to the *Further Notice of Proposed Rulemaking* in the

above-captioned proceeding.[1] As Northrop Grumman detailed in its *Comments*[2] filed in response to the *Further Notice*:

- The Commission should proceed with reconfiguring the Public Safety Band for broadband, consolidating the narrowband spectrum into the upper half of the band;[3]
- As the Commission tentatively concluded, wideband operations should not be permitted, because "wideband" Scalable Adaptive Modulation (SAM) / TIA-902 technology is a disharmonious neighbor to broadband technologies, due to the significantly higher transmit power densities of wideband technology and its heavy reliance on frequency coordination to avoid interference. In return for the compromises in performance and inefficiencies in spectrum use necessary to accommodate wideband operations, wideband technology offers no benefit to public safety, inasmuch as broadband technologies equal or excel over the capabilities of wideband in all environments, urban, suburban and rural, on all counts including functionality, spectrum efficiency and cost;[4]
- To assure availability of narrowband interoperability channels nationwide without requirement of frequency shifts or migrations in the future, the band plan must create a single homogeneous allocation of narrowband and broadband Public Safety spectrum throughout the nation, including the border regions with Canada and Mexico. There must also be a mechanism for funding the costs of consolidating the narrowband spectrum

[1] *Report and Order and Further Notice of Proposed Rulemaking, Service Rules for the 698-746, 747-762 and 777-792 MHz Bands,* WT Docket No. 06-150 *et al.*, FCC 07-72 (April 27, 2007) ("*Further Notice*").
[2] *Comments of Northrop Grumman Information Technology* in WT Docket No. 06-150 *et al.*, filed on May 23, 2007 ("NGC Comments").
[3] *Id.* at 2-3.
[4] *Id.*

incurred by public safety. Proposals 1 and 2 fail to meet these requirements.[5] Proposals 3, 4 and 5 meet these prerequisites,[6] and one of them should be adopted;[7]

- If proposal 4 or 5 is adopted, it should be modified to change the size of the E Block from 10 MHz (2 x 5 MHz) to 12 MHz (2 x 6 MHz), and correspondingly to reduce the size of the C and D blocks from 11 MHz (2 x 5.5 MHz) each to 10 MHz (2 x 5 MHz) each, to ensure that the E-Block licensee will have sufficient spectrum access to support its required build-out and operation of the combined public safety / commercial network;[8]

- If the proposal of Frontline Wireless, LLC ("Frontline") or a similar one is adopted, interim deployment of local and regional broadband networks by public safety should be permitted in locations where the national broadband network will not be built out in the near term,[9] but only in consultation and coordination with the national licensee, to ensure that the interim network architecture will harmonize with and be capable of integration into the national broadband network;[10] and

- Such local and regional interim networks should have available to them the full 5 MHz pair of Public Safety broadband spectrum in order to accommodate advanced 4G broadband wireless technologies, and should not be limited just to some portion of that spectrum.[11]

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[5] *Id.* at 4.
[6] *Id.* Northrop Grumman also continues to urge the Commission to adopt the Broadband Optimization Plan, given the greater potential improvements in both the public safety and commercial bands that can be achieved with it. *Id.* at 5 n.10.
[7] If the Commission adopts the Frontline proposal or a similar one, proposal 4 or 5 is appropriate inasmuch as they include the requisite "E Block." Otherwise the Commission should adopt proposal 3. *Id.* at 5.
[8] *Id.* at 5-6.
[9] *Id.* at 6.
[10] *Id.*
[11] *Id.*

I. The Advantages of Broadband and the Limitations and Negative Effects of Wideband Have Been Further Documented by Commenters

Amplifying Northrop Grumman's point that the spectrum now designated for broadband should remain exclusively for broadband, other significant commenters have submitted additional detailed technical data and analyses documenting the advantages of broadband technologies and the disadvantages of the SAM / TIA-902 wideband technology. Qualcomm Incorporated ("Qualcomm") sets forth in great detail how broadband delivers data much faster than wideband and provides much better coverage[12] while delivering vastly superior capacity, contrary to the analyses of wideband proponent Motorola, Inc. ("Motorola").[13] Alcatel-Lucent also has supplemented the record, further establishing how broadband technologies are more capable and more cost-effective that wideband systems,[14] and similarly taking issue with the comparisons and analysis by Motorola:[15]

> Motorola, the sole contributor of technical analysis in support of wideband in this proceeding, has consistently maintained that wideband offers superior range compared to broadband. Other commenters have repeatedly cited Motorola's claim as a fundamental reason in support of "flexibility" to allow wideband and broadband deployment....Motorola's analysis is flawed, and its conclusions are far off the mark.[16]

Northrop Grumman shares this concern that support for wideband in the record in this proceeding has been cultivated through such deficient technical comparisons with improper conclusions.

Alcatel-Lucent also underscores that permitting mixed deployment of broadband and wideband will undermine public safety capabilities, among them interoperability "because it will

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[12] *See Comments of Qualcomm Incorporated* in WT Docket No. 06-150 *et al.*, filed May 23, 2007 ("*Qualcomm Comments*") at 17-37.
[13] *Id.* at 27-30.
[14] *See Comments of Alcatel-Lucent* in WT Docket No. 06-150 *et al.*, filed May 23, 2007 ("*Alcatel-Lucent Comments*") at 3-13. Qualcomm and Alcatel-Lucent base their comparison on third generation (3G) Code Division Multiple Access (CDMA) technologies. More advanced fourth generation broadband technologies are even more robust and attractive from a total cost, coverage and performance standpoint in comparison to SAM / TIA-902.
[15] *Id.* at 5-8, 10-11.
[16] *Id.* at 5.

allow the proliferation of 'islands' of wideband deployments that will not be interoperable with more prevalent broadband equipment."[17] As Alcatel-Lucent puts it, "the resulting fragmentation of the 700 MHz band due to sporadic wideband applications" will complicate the ability of broadband technologies to access the spectrum they require to operate.[18]

Northrop Grumman has deployed both 700 MHz broadband and 700 MHz Land Mobile Radio technologies including wideband in multiple pilots across the U.S. Based on that experience, Northrop Grumman in its role as a technology-neutral systems integrator encourages its public safety customers to deploy the better performing and more spectrally efficient broadband technologies over wideband.

Since there are no technological or cost advantages for wideband, there simply is no basis whatsoever to compromise the broadband Public Safety spectrum by allowing wideband operations. Any "flexibility" allowing wideband would, in reality, have the perverse effect of reducing interoperability and undermining the ability of public safety to transition to and leverage future innovations in broadband technology. The Commission should affirm its tentative conclusion to allow only broadband operations and should not permit any wideband operations in the Public Safety Band.

II. The Guard Band Licensees Have Committed to Fund Narrowband Consolidation Under Proposals 3, 4 or 5

As Northrop Grumman previously stated in its comments, the band plan for the 700 MHz Public Safety Band should include a funding mechanism that will relieve public safety from having to bear the costs of consolidating the narrowband spectrum, including equipment conversion costs and updating of the Computer Assisted Pre-Coordination Resource and

[17] *Id.* at 14.
[18] *Id.*

Database System (CAPRAD).[19] As anticipated, a group of most of the Guard Band licensees has in their comments affirmed their commitment to pay these costs if proposal 3, 4 or 5 is adopted.[20] Accordingly, proposals 3, 4 and 5 would meet this important criterion, and Northrop urges the Commission to adopt proposal 3, or a modified version of proposal 4 or 5, as detailed in its comments.[21]

III. Proposals to Set Aside or Reserve Only Portions of the Broadband Spectrum for Local or Regional Interim Systems Would Preclude Use of 4G Broadband Technologies

The proposals of Motorola and others to divide the Public Safety Band's broadband spectrum will undermine the interest of public safety in achieving prompt access to forwarding-looking, high-capability, affordable technology. For example, Motorola urges the Commission to bifurcate the 700 MHz Public Safety Band plan to apportion "3.50 – 3.75 MHz" to "Nationwide Broadband," and "2.25-2.50 MHz" to "Local & Regional BB/WB."[22]

While such a band plan might help bootstrap potential deployment of wideband systems, it would also entirely preclude the use of fourth generation (4G) broadband wireless technologies, both in the "Local & Regional" segment and the "Nationwide Broadband" segment. Access to any amount less than 5 MHz would only allow build-out of wideband (SAM / TIA-902) technology, or only a single carrier of 3G CDMA technology (EV-DO Rev. A, with limited throughput of 3 MB shared by all users), while preventing *all* of the 4G (true broadband) technologies such as Long Term Evolution (LTE), UMTS Time Division-CDMA (TD-CDMA), Universal Mobile Telecommunications System (UMTS) Wideband CDMA (WCDMA), IEEE

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[19] *See NGC Comments* at 4.
[20] *See Comments of Access Spectrum, LLC, Dominion 700, Inc., Harbor Guardband, LLC, and Pegasus Communications Corporation* in WT Docket No. 06-150 *et al*, filed May 23, 2007, at 3 n.2, 10-14, 24.
[21] *See NGC Comments* at 4-6.
[22] *Comments of Motorola, Inc.* in WT Docket No. 06-150 *et al.*, filed May 23, 2007, at 23-24. *See also Comments of The National Public Safety Telecommunications Council* in WT Docket No. 06-150 *et al.*, filed May 23, 2007, at 19-22; *Comments of Association of Public-Safety Communications Officials-International, Inc.* in WT Docket No. 06-150 *et al.*, filed May 23, 2007, at 20-21.

802.16 WiMAX (to be adapted for 5 MHz), and the 4G versions of CDMA technology (multicarrier CDMA such as EV-DO Rev. B and Ultra Mobile Broadband) and of FLASH-OFDM (Orthogonal Frequency Division Multiplex) technology.[23] Limiting technology choices in this manner will deprive local and regional build-outs of significant cost savings from competition and future economies of scale, and could frustrate or eliminate the possibility of harmonizing interim build-outs with the national network's 4G technology choice(s), condemning some interim build-outs to being useful only during the interim period, then becoming stranded investments. Dividing the spectrum as proposed also would significantly limit the overall capacity of interim systems, since solutions using 3.75 MHz or less cannot capitalize on the substantially greater capacity of 4G broadband technologies.

Rather than earmarking a subset of the spectrum, Northrop Grumman urges the Commission to allow local and regional interim networks to use up to all of the 5 MHz pair in their locales if they opt to utilize technologies that require it, enabling them to use advanced 4G broadband wireless technologies in coordination with the national licensee.

IV. It is Premature to Set A Specific Standard for Broadband Technologies

Some commenters in this proceeding that presently provide third generation (3G) broadband wireless technologies have advocated that the Commission adopt a single specific uniform standard for public safety broadband wireless systems for interoperability purposes.[24] Setting a standard now, when advanced 4G technologies are still in the early phase of market entry, would be premature and stifle public safety's present and future access to the marketplace

[23] 4G technologies have greater throughput (on the order of 10x) versus 3G technologies (and even more versus the more limited throughput of wideband) and are the focus of the bulk of the research and development in commercial wireless standards.

[24] *See, e.g, Alcatel-Lucent Comments* at 21-23.

and commercial innovation.[25] Moreover, it likely will prove unnecessary for the Commission to set such a standard in order to achieve interoperability. As Northrop Grumman has commented before, interoperability will develop through the evolution of commercial broadband wireless and network standards, IP-based design of networks with new standardized layers now being used commercially such as IP Multimedia Subsystem (IMS), and the robust adaptability of the latest broadband wireless user equipment, with multi-band function and/or software-defined characteristics, providing imbedded interoperability.[26] Northrop Grumman urges the Commission to dismiss the commenters' notion of setting any specific standard for public safety broadband. A rigid standard would only serve the needs of some equipment vendors, and not the long-term needs of public safety. For too long, public safety has been on the outside looking in at the incredible innovation that the commercial marketplace creates year after year.

[25] With such a large amount of additional commercial 700 MHz spectrum soon to be auctioned and licensed by the Commission, and with the date by which television stations will be cleared from the band drawing ever closer, it is expected that development of 4G wireless standards for the 700 MHz band, and growth of economies of scale for such equipment, will greatly accelerate, providing expanding technology opportunities for public safety.

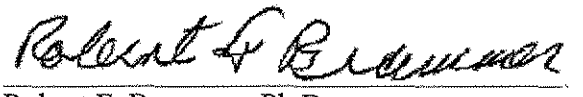
[26] *See Comments of Northrop Grumman* in WT Docket No. 96-86, filed June 6, 2007, at 7; *Comments of Northrop Grumman* in PS Docket No. 06-229 and WT Docket No. 96-86, filed February 26, 2007, at 9-10.

Conclusion

The Commission can meaningfully improve both the public safety and commercial spectrum band plans in the Upper 700 MHz band by amending its rules as set forth above and in Northrop Grumman's earlier *Comments*.

Respectfully submitted,

NORTHROP GRUMMAN INFORMATION TECHNOLOGY, INC.



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